IN THE SPECIFICATION

Please amend the specification (~~strikethrough~~ indicating deletion and underline indicating insertion) as follows:

[0025] Two sets of flux plates 4, 12 and 13 provide return flux paths for the system. The design of one of the flux plates 4 is shown in FIG. 6. The system is symmetric with respect to its components. The left side of the system in FIG. 1 is shown assembled whereas the right side is shown disassembled. Therefore, only the disassembled components will be described. Each flux plate 4 preferably has five blind holes on one side and one blind hole on the other side. The five holes are made for insertion of the ends of the permanent magnets 2 and the other hole is made for insertion of the end of the electromagnet core. These plates 4 preferably are made of silicon steel material. Eight electromagnet coils 11 are included in the system. Only four of the coils 11 are shown in the disassembled portion of FIG. 1. The coils 11 preferably have silicon steel cylindrical cores. These coils 11 are arranged in two sets. One set is located on one side of the stator 1 and the other set on the other side in symmetrical way.

[0026] Two sets of return flux path plates 12 and 13 are incorporated into the system. Each set includes two separate semicircular pieces. Each piece connects two coils from one side of the system, which will be referred to hereinafter as X-coils or Y-coils. These return flux path plates 12 and 13 preferably are made of silicon steel material. The preferred design of the flux plates is shown in FIGS. 7A and 7B. A passive supporting bearing subassembly 7, 8, 10 and 14 (FIG. 1) provides support for the axial positioning of the rotating floating ring 3. This subassembly includes two annular disks 14 and 16 having annular grooves where ring permanent magnets 8 and 10 are installed. One of the annular disks 14 is mounted on the floating ring 3 and has a groove formed in it in which one of the ring permanent magnets ~~11~~10 is installed. The other annular disk 16 in which the other ring permanent magnet 8 is installed is mounted on stationary support part 7. The stationary support part 7 in accordance with the preferred embodiment is shown in FIG. 8.

The preferred designs for the floating ring spacer 6 and the stator spacer 5 are shown in FIGS. 9 and 10, respectively.

[0027] The ring permanent magnets 8 and ~~11~~10 are arranged to operate in a repulsive mode. This arrangement is capable of supporting the rotating ring 3 in the axial direction during rotation. FIG. 4 illustrates the design of the floating ring 3 in accordance with the preferred embodiment. The ring-spinning system device is assembled together by eight non-ferrous material bolts. FIG. 3 shows the principal of operation of the system of the present invention. The permanent magnets 2 (FIG. 1), which are arranged on the stator body 1 (FIG. 1) uniformly, are used to generate a fixed magnetic field capable of supporting the floating ring 3 (FIG. 1) in the Z direction (i.e., the axial direction of the system). The electromagnetic coils 11 are arranged in two sets; one set of 4 coils working in the X direction and the other set working in the Y direction. Each set includes two groups of coils. Each group has two coils arranged on the two sides of the stator body 1 and the flux plates ~~8~~12 and 13 between them.

[0028] In FIG. 3, the floating ring 3 is shown displaced a small distance off its central position to the right, or in +X direction. The dotted lines in FIG. 3 represent the magnetic field intensity generated by coils 11 (C1, C2 excited in one direction and C3, C4 excited in the other direction). The arrows on that line show the direction of the field. On the other hand, the permanent magnets 2, ~~which are identified as PM1 and PM2 in FIG. 3~~ generate two field intensity paths shown as solid lines with the arrows indicating the direction of the field lines. Examining the right hand side air gap, which has a smaller gap than the left side gap, the net magnetic field intensity is the difference between the field generated by the permanent magnet 2 and the one generated by the coils C1 and C2. On the other side, the net magnetic field intensity is the sum of the two fields. In other words, the magnetic field intensity at the smaller air gap is reduced and the field intensity at the larger air gap is increased. Therefore, the net restoring force acting on the floating ring 3 will act in the -X direction, i.e. to restore the ring to its central position. The same principal works as well in

the Y direction. Therefore, by controlling the direction and value of the current passing through the coils C1, C2, C3 and C4 the ring 3 can be centered.

[0029] The modification of the field intensity at the air gap may be referred to as field modulation. The two sets of the electromagnetic coils 11 (C1 – C4) and their flux paths are separated by using the two return path plates 12 and 13 (FIGS. 1, 7A and 7B), which preferably have about 5 millimeter (mm) air gap between them. This arrangement eliminates, with a great success, the coupling between the X and Y sets of coils 11.

[0030] For full validation of the present invention, a complete finite element model 28 was carried out, as shown in FIG. 11. The real model was enclosed within a cylinder of air with a greater diameter than the model by 150% and greater in height by 150%. This was needed to apply far field boundary conditions at the surfaces of that cylinder. These boundary conditions were imposing a tangential flux field at all the bounding surfaces of that cylinder. FIG. 11 shows the model meshed with air cylinder removed. The total number of elements used to mesh this model is 370000. This huge number of elements is used in order to obtain the most accurate results. On the other hand, the time taken to perform one run is about 10 min. This type of analysis has the advantage over the other methods (i.e. closed form solution . . .) in that there is no simplification of the model geometry and it takes into consideration any flux leakage.

[0033] FIG. 12 shows the relation between the restoring force and the excitation current for 0.25, 0.5, 0.75 mm displacement of the floating ring from its central position, as indicated by curves 41, 42 and 43, respectively. At the point (F0) of intersection with the current axis the sum of the forces acting on the ring is equal to zero. This does not mean that there is no force holding the ring at that point, but the force holding the ring in the X direction is equal to the force in the -X direction. So, by increasing the current with a small amount the ring will start to move in the direction where the air gap is larger. By this action the floating ring win restore its central position, as represented by curve 45 in Fig. 13.

[0034] FIGS. 8, 9 and 10 show nonmagnetic spacers 5 and 6 and the supporting ~~ring~~disk 7. As described above, the two spacers 5 and 6 are mounted on the floating ring 3 and the other two (not shown) are mounted on the stator body 1 facing the other two spacers 5 and 6. The clearance between the facing spacers preferably is designed to be 0.75 mm in order to leave a 0.25 mm as an air gap between the floating ring and the stator. This 0.25 mm air gap is important in start up of the device. Of course, the present invention is not limited to any particular dimensions for the components described herein. However, for this particular design it has been determined that if this gap is less than this value the field modulation will not be able to pull the floating ring away from the stator. However, inversely, the magnetic force will increase in the direction of closing that gap more. This is quit clear from FIG. 12 at the 0.25 mm gap curve 31, where it can be seen that this curve is nearly tangent to zero force at 2.25 ampere (A), and if the current is increased the force starts again to increase in the opposite direction (i.e., trying to close the small ~~gab~~ gap further).

[0035] The supporting disk 7 (support the floating ring 3 in the Z direction) will allow 1 mm for the floating ring 3 to be shifted downwards due to any unexpected disturbance. The permanent magnets 2 will still be capable of lifting the floating ring 3 up again. This action can be seen from FIG. 13 at 1 mm displacement where the resultant force in the Z direction is still about 5 Newton (N) as indicated by point 46 on curve 45.